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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,489	10/23/2001	Yoichi Suzuki	SOEI/0011	9428

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EXAMINER
BERRY, RENEE R

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/004,489	Applicant(s) Suzuki et al.
	Examiner Renee Berry	Art Unit 2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above, claim(s) *19 and 20* is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-18* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-18 are, drawn to a deposition method of forming a silicon inorganic insulating film, classified in class 438, subclass 778.

   II. Claims 19 and 20 are, drawn to a deposition apparatus, classified in class 118, subclass 500+.

2. The inventions are distinct, each from the other because of the following reasons: Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used to practice another and materially different process, such as etching.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. A telephone call was made to William Patterson on March 16, 2003 to request an oral election to the above restriction requirement, but did not result in an election being made

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent no. 6,136,685 toNarwankar in view of US patent no. 6,503,846 to Niimi.

In regard to claim 1, Narwankar teaches a deposition method of forming a silicon inorganic insulating film on a substrate by placing a substrate in a semiconductor manufacturing apparatus having a parallel plate type electrodes; and depositing a fluorine-containing silicon

insulating film on the substrate by generating a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance at column 14, lines 15-25.

In regard to claim 2, Narwankar teaches introducing the process gas containing SiH_4, SiF_4, and oxygen source substance into a chamber at column 14, lines 15-25.

In regard to claim 3, Niimi teaches the RF power applied to the parallel plate type electrodes in 100 Watts or more at column 4, lines 41-42.

In regard to claim 4, Narwankar teaches the RF power applied to parallel plate type electrodes is 1400 Watts or more at column 15, lines 9-13.

In regard to claim 7, Narwankar teaches the oxygen source substance includes at least one substance of CO, CO_2, and H_2O.at column 17, lines 11-16

In regard to claim 9, Narwankar teaches the flow rate ratio of the SiF_4 to the silane is larger than 1 at column 15, Table 1.

In regard to claim 10, Narwankar teaches the RF power applied to the parallel plate type electrodes is modulated with a single frequency at column 16, lines 51-55.

In regard to claim 13, Narwankar teaches a method of making a semiconductor device having conductive portions of a damascene structure on a substrate by depositing a fluorine-containing silicon insulating film on a substrate by generating a plasma of a process gas containing SiH_4, SiF_4, and an oxygen source substance, the process gas being introduced into the chamber of the semiconductor manufacturing apparatus having parallel plate type electrodes; and forming the conductive portions of the damascene structure in the silicon insulating film at column .

In regard to claim 14, Narwankar teaches forming depressed portions in the silicon insulating film; and forming conductive material in the depressed portions.

In regard to claim 15, Narwankar teaches the RF power applied to a parallel plate type electrode is at least 100 Watts at column 15, Table 1.

In regard to claim 16, Narwankar teaches the RF power applied to a parallel plate type electrodes is at least 4 Watts/sccm at column 15, Table 1.

In regard to claim 17 and 18, Narwankar teaches the RF power applied to a parallel plate type electrodes is at least 4 Watts/sccm at column 15, Table 1.

However, Narwankar does not teach all the limitations of the claims.

In regard to claim 5, Niimi teaches oxygen source substance includes at least one substance of N_2O, NO, N_2O_3, N_2O_5, NO_3, N_2O_4, and NO_2.at column 4, lines 30-42

In regard to claim 6, Niimi teaches oxygen source substance includes at least one substance of O_2 or O_3 .at column 4, lines 30-35.

In regard to claim 8, Niimi teaches the RF power applied to the parallel plate type electrodes is at least 4 Watts/sccm at column 15, Table 15.

In regard to claim 11, Niimi teaches the pressure in the reaction chamber in the deposition step is not more than 666 Pa at column 7, lines 33-37.

In regard to claim 12, Niimi teaches the deposition temperature in the deposition step is not more than 480 ^{0}C at column 6, lines 26-29.

Therefore, it would have been obvious to one having ordinary skill in the art to have modified Narwankar to include oxygen source substance includes at least one substance of N_2O, NO, N_2O_3, N_2O_5, NO_3, N_2O_4, and NO_2., oxygen source substance includes at least one substance of O_2 or O_3, the deposition temperature in the deposition step is not more than 480 ^{0}C since such a modification would result in a lost cost method of plasma nitridation to ensure high reliability, as described in column 2, lines 20-30 of Niimi.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. R. Berry whose telephone number is (703) 305-4544.

David Nelms
Supervisory Patent Examiner
Technology Center 2800

RRB

June 20, 2003